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ML's sled design carries AF athlete to winter olympic trials

by Pete Meltzer Jr., *Materials and Manufacturing Directorate*

WRIGHT-PATTERSON AFB, Ohio — Engineers at the Air Force Research Laboratory Materials and Manufacturing Directorate's Advanced Composites Office (ACO), Hill AFB, Utah, redesigned the aerodynamic component of a "skeleton" racing sled that helped carry an Air Force athlete to the 2002 Winter Olympics trials.

According to ACO Manager Lawrence Coulter, the redesign effort provided valuable hands-on computer aided design (CAD), three-dimensional modeling experience, while providing Air Force Maj. Brady Canfield, based at Hill AFB, with an opportunity to hone his skills and eventually compete for a position on the men's Olympic skeleton team. Canfield placed fourth at the trials, just missing a spot on the United States' three-member squad.

"The redesign project was directly beneficial to the ACO as a learning exercise," Coulter explained. "We had several new engineers that had received training on new software and manufacturing methods but had not had the opportunity to practice their new skills. This was an ideal opportunity to put into action the techniques required to create solid models, design tooling and manufacture a composite part.

"This training has since been used to design and manufacture flight worthy composite parts (and undertake critical aircraft repairs)," Coulter added.

Skeleton racing is the oldest known competitive downhill sled racing sport in the world. It originated in St. Moritz, Switzerland in the late 1800's and developed into two

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COMPETITIVE EDGE — ACO engineers at work during the skeleton sled redesign project.

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<http://extra.afrl.af.mil/news/index.htm>

AFRL bests CFC goal by more than 40 percent

by Katherine Gleason, AFRL Public Affairs

WRIGHT-PATTERSON AFB, Ohio — When the 2001 Combined Federal Campaign (CFC) kicked off on October 3, the Air Force Research Laboratory's goal was to collect \$273,000 in donations. Six weeks and \$382,852 later, AFRL had exceeded its goal by more than 40 percent.

More than 50 percent (1,064 of 2,125) of AFRL personnel contributed to the CFC in 2001, with a per capita donation amount of \$170.91, and an average donation amount of \$341.34. Within AFRL, each directorate also surpassed expectations. The Materials and Manufacturing (ML) directorate led the way by collecting 154.63 percent of its initial goal.

Although the CFC is in its 37th year, AFRL worked hard to make sure all personnel had access to CFC donation forms and information. 2nd Lt. Rodrick Koch, AFRL/XPE, assisted in this effort by distributing forms, tallying numbers, and briefing Gen Nielsen on the progress of the campaign.

"It felt really good to be able to help out," said Koch. "The money raised will help make our community better."

While individual donations account for a substantial portion of the money raised, the directorates also participated in 21 fundraisers that generated nearly \$3,000 for the campaign. The Human Effectiveness Directorate organized "Alien Bowling," which raised \$600, earmarked for the United Way September 11 fund.

Maj. Gary Martinsen, Wright-Patterson AFRL CFC Co-Chair, commented that this year's AFRL totals were particularly impressive because of the high goals that were set. Martinsen also noted that donations this year were higher than at any point in the program's history.

Established by Executive Order in 1964, the CFC is an annual fund-raising drive in which Federal employees and military personnel work to raise millions of dollars to benefit charitable organizations worldwide. CFC charities include: The United Way, the American Cancer Society, Goodwill Industries, Big Brothers/Big Sisters, the Red Cross, and many others. The Miami Valley CFC district consists of 11 counties in Southwestern Ohio, including Wright-Patterson AFB.

For more information on the Miami Valley/Wright Patterson CFC, visit <http://cfc.wpafb.af.mil>. @

Find additional Features on the web

Breakthrough benefits aging aircraft fleet

ACE is driving force for new capabilities to warfighter

ML experts ensure Air Force flies safe and affordably

DE lab physicist earns top DoD civilian award for research

by Rich Garcia, Directed Energy Directorate

KIRTLAND AFB, N.M. — Research physicist, R. Russell Butts, was presented the Department of Defense's highest civilian award at a Pentagon ceremony in December.

Butts, of the Air Force Research Laboratory's Directed Energy Directorate, received the Distinguished Civilian Service Award for his scientific work.

According to a citation that accompanied the award, Butts was praised for leading a research team, which developed essential technologies that will enhance America's missile defense capabilities. He directed his team's work on laser beam control capabilities for the Airborne Laser (ABL), a jumbo jet that will use a high-power laser to destroy ballistic missiles in their boost phase.

A supervisory principal scientist, Butts joins two other directorate scientists who have received this award over the past four years. In 1999, William L. Baker, the directorate's chief scientist, and in 1997, Robert Q. Fugate, senior scientist for atmospheric compensation, each

received the award. In the past 40 years, fewer than 50 Air Force civilians have been presented this honor.

Between 1992 and 2000, the North Texas State University graduate led a 25-member team whose experiments and analysis validated the program's ability to transmit laser beams in the earth's upper atmosphere.

In 1992, Butts devised experiments that demonstrated the weapon system's ability to transmit lethal levels of laser energy over long distances through atmospheric disturbance. His experiments showed that the basic structure of atmospheric disturbances in the atmosphere's upper layers was not significantly different from the earth's boundary layer. @



R. Russell Butts

Sled design (from page 1)

Winter Olympic events: bobsled and luge. Skeleton has traditionally been an Olympic event only when St. Moritz hosts the competition, but this year it will be included in the Salt Lake City Games.

The skeleton sled is comprised of a steel chassis and steel runners. The athlete lies face down on top of the sled in a head first position. The bottom of the sled or "pod" is comprised of a steel (sometimes fiberglass) sheet affixed to the underside of the chassis to provide aerodynamic benefits, much like the underside of a high performance race car.

The sled has no steering, braking or propulsion capability. It moves only by the pushing force provided by the athlete at the beginning of the race and the force of gravity as it winds through the course, sometimes at speeds over 80 mph.

According to Coulter, the skeleton sled component was an ideal choice, since Canfield and another active duty military member at Hill AFB, Senior Airman Trevor Christie, are active competitors and could readily apply and test the results of the redesign effort.

A hand built model of the pod was used to generate a three dimensional representation, which was then placed into a CAD program used to change the part's shape, Coulter explained. To optimize the part's contour for airflow, ACO engineers made two different designs, each conforming to the standard two-feet wide by three-foot long dimensions.

Next, the model was downloaded to a five-axis router and a wooden master was cut. The master was then used to make a fiberglass female mold, which was employed to produce a hand lay-up part, using a graphite epoxy sometimes employed on aircraft. The new pod was autoclave cured to ensure the needed strength and stability, Coulter said.

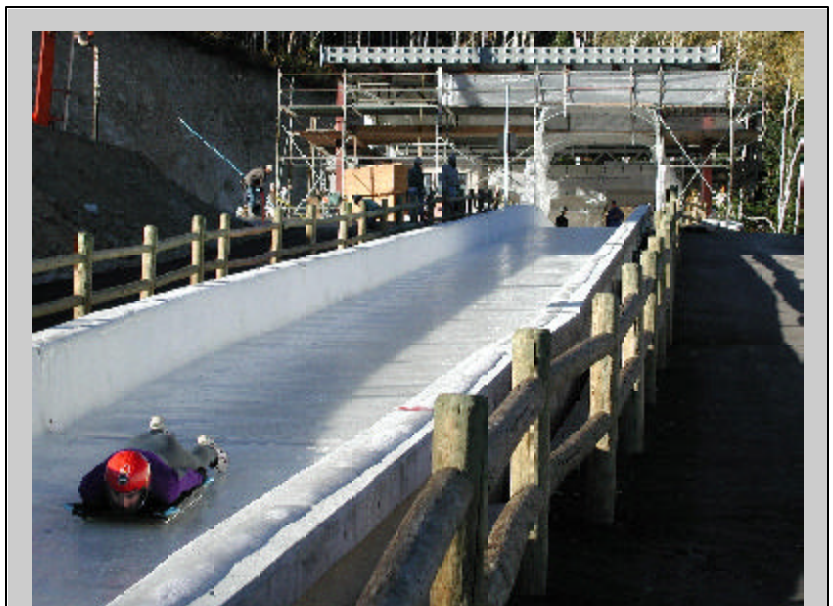
Canfield and Christie both qualified in round one of the U.S. Nationals in October 2000, and joined 16 others from a field of 41 hopefuls to compete in round two in Calgary, Canada in November 2000 and qualify for the World Cup team. Canfield finished second in the men's races at Calgary with a best heat time of 49.44

seconds—no less than a Silver Medal finish—and later earned his way to second best in the United States.

"The skeleton track is about one mile of ice. Unlike skiing, we don't have slopes, and snow slows us down considerably," Canfield explained.

"I approached (the ACO) team almost two years ago, when the rules concerning the shape of our sleds made both my sled and Airman Christie's illegal. All the fiberglass pods warp in extreme temperatures, causing concavities to the point of making the sleds out of spec. The ACO team showed up at the track one day with pods for both Airman Christie and myself, and we haven't had a concern over either of our sleds passing inspection since," Canfield said.

"The gravy is that the pods are lightweight and fast. The pods also give us a very unique and proudly military look," he added. @



READY, SET, GO — Air Force Maj. Brady Canfield, begins a practice run on a downhill track.

Fuel processor will improve power generation overseas

by Timothy R. Anderl, Materials and Manufacturing Directorate

WRIGHT-PATTERSON AFB, Ohio — Researchers at the Air Force Research Laboratory's Materials and Manufacturing Directorate (ML) are developing a deployable Logistics Fuel Processor that will permit development of a compact, highly reliable fuel cell power system. This processor serves as an alternative to current Mobile Electric Power (MEP) systems.

The fuel cell power system will be significantly lighter and leaner than current MEP systems, allowing for easy deployment of infrastructure elements needed to sustain overseas operations.

Today's Air Force must be increasingly prepared to rapidly deploy and indefinitely sustain forces to protect vital U.S. interests. Operations abroad require mobile, air deployable infrastructure elements to stage and support land and air operations in remote locations. MEP is one of the seven essential deployment infrastructure elements.

According to Aly Shaaban, an engineer with ML's Air Expeditionary Forces Technologies Division, a Logistic Fuel Processor will extract hydrogen from logistic fuel, such as JP-8, and feed hydrogen to a fuel cell stack that generates electricity. "The compact and modular power generator we are developing, which consists of the fuel processor and fuel cell, will enable a 16 percent reduction in deployment airlift requirements, and will offer lower emissions, infrared signature and noise levels. It will also reduce power generation sustainment costs by 50 percent," Shaaban said.

Shaaban said that an effective approach to reducing the size and response time in fuel processors is to combine catalytic steam reforming with micro-channel technology in a slab configuration. Micro-channels are small passages, less than 500 microns wide. The channels improve heat transfer, and enhance catalytic residence time, and heat and mass transfer.

"Because the technology is so compact and modular in design, it will allow integration in both portable units and large electrical generators," Shaaban said. Using micro-channels, Shaaban and his peers have developed a prototype logistic fuel processor that extracts enough hydrogen to produce 3kW of electricity. This development demonstrates the potential for an eight cubic foot 800 kW logistics fuel processor. This will permit development of an integrated processor/fuel



A Mobile Electric Power-12 (MEP) generator

cell stack that would outperform conventional MEP generators at a fraction of their size.

In the past, researchers have faced challenges in developing this kind of technology because the logistics fuel's sulfur content will poison fuel cells. Coking is an additional pitfall related to reforming heavy hydrocarbon fuels such as JP-8 and diesel. However, Shaaban said that the directorate's processor is capable of removing 99.98 percent of the sulfur that exists in fuel. Using new hydrogen membrane technology and an improved reforming process, the processor removes impurities such as carbon monoxide, carbon dioxide, and hydrogen sulfide and produces ultra-clean hydrogen.

The new fuel processor also uses an efficient radiant burner, developed by engineers in the lab, and a compact micro-channel evaporator to produce the high temperature steam needed for the fuel reforming process. A compact condenser unit recovers water from 100 percent humid fuel exhaust and recycles it for future reforming.

Air Force researchers expect to have completed a 3 kW fuel cell power generator by the end of 2002 and a 10kW generator by the end of 2005. @

Senator Clinton takes part in Rome technology briefing



SENATOR CLINTON VISITS AFRL ROME SITE — U.S. Sen. Hillary Rodham Clinton visited the Air Force Research Laboratory Information Directorate at Rome Jan. 14 for a briefing on the laboratory's research and development efforts in support of information assurance technology that can protect computers and other communications systems from terrorism. Joining Clinton were state Assemblywoman RoAnn M. Destito; and Raymond P. Urtz, director of the Information Directorate. (Air Force photograph by Albert P. Santacroce)

Agile Acquisition - Commander envisions better support to America's warfighters

by Gen. Lester L. Lyles, Commander, Air Force Materiel Command



General Lyles

WRIGHT-PATTERSON AFB, Ohio (AFMCNS) — Launching Agile Acquisition provides an exciting opportunity for all of us in the business of developing, acquiring, testing, and sustaining the weapon systems our Air Force uses to defend America's freedom!

Agile Acquisition opens the door for real, meaningful change; change that will enable us do our jobs better and, most importantly, provide better support for our customers: this nation's warfighters.

The "Lightning Bolts" that implement this new way of doing business give us the tools we need to make these changes. They will touch the entire Air Force, especially through Lightning Bolt #5, which will transform the services contracts that affect every one of us. They will focus our acquisition efforts and, at the same time, reinforce our other initiatives to transform and improve the services and products we provide.

In particular, Enterprise Management in AFMC ties in perfectly with Agile Acquisition. Enterprise Management shatters stovepipes!

It gives individual managers the responsibility and authority to look at broader concepts and issues affecting programs that are different. It gives warfighters a single point of contact to access the acquisition process on a system or program. These two efforts will work together to take us where we need to go to keep America's warfighters the most powerful and respected force in the world.

We must make sure we're developing, finding, adapting and delivering the best mix of capabilities to our air and space warriors in the minimum amount of time. To do that, we're taking a close look at everything we do across the full acquisition spectrum, from the

conception of a new weapon system right on through to how we maintain and sustain it after it's fielded. Enterprise Management makes AFMC well prepared for doing this analysis and implementing the changes we need.

The changes Agile Acquisition will demand are revolutionary! That's as it should be.

Our world, and our mission, have changed radically in the past few months. We must change with it to ensure we provide the warfighter a responsive and effective acquisition system that meets his changing needs.

Agile Acquisition has my full support and commitment. To be successful, it must have yours.

I trust you will all give it your highest level of attention and the full force of your tremendous creativity, expertise and dedication. Our future depends on it! The future of our nation, and the success and safety of our fighting forces hinge on our ability to do what must be done.

Let me make one thing perfectly clear. This is not change for change's sake. We're talking about breaking down barriers and eliminating institutional inertia, rules and processes that rob people of creative spirit or don't add value.

It's imperative that we provide absolutely the best and newest capabilities to our fighters in the shortest time possible. We can't settle for providing today's technology tomorrow. We must, and we will, find ways to provide tomorrow's technology today!

The stakes are high. Failure is not an option.

We have support from Air Force leadership to make the changes we need to make. Lightning Bolts 2002 give us the tools to make those changes. And, most importantly, we have the people with the ability to make all this happen in our dedicated acquisition worker force throughout the Air Force. @

SPIE elects MN engineer as secretary

by Rex Swenson, Munitions Directorate

EGLIN AFB, Fla. — Donald R. Snyder, Air Force Research Laboratory Munitions Directorate has been elected as Secretary of the SPIE (The International Society for Optical Engineering) High Speed Photonics and Photography International Technical Committee.

"As a Fellow of the Society, along with other Air Force members who serve in this capacity, it is an honor to help to encourage and support new talent that eventually will provide us with the knowledge and technology needed for a Photonic Age Force," Snyder said of his appointment. "Just as we led the S&T revolution through the electronic and information ages, this new generation will lead the Air Force into the Photonic Age."

Snyder has also been invited to serve on the SPIE Scholarship and Grant Committee for 2002. The committee chooses scholarship and grant recipients annually in August of each year.

Established in 1978, the mission of SPIE's scholarships and grants program, established in 1978, is to recognize, assist and encourage students with outstanding potential for long-range contributions to the field of optics. @

Rome Research Site tops 2001 CFC goal

by Fran Crumb, Information Directorate

ROME, N.Y. — The Air Force Research Laboratory Rome Research Site has completed its 2001 Combined Federal Campaign fund drive — surpassing its \$55,000 goal by nearly 15 percent.

The nearly 800 military and civilian employees assigned to the laboratory's staff at Griffiss Business and Technology Park pledged \$63,067 to the campaign, which benefits a large number of local and national charitable organizations, including the Rome Area United Way.

"Staff members at the Rome Research Site showed outstanding spirit and commitment exceeding the campaign's goal in these exceptional times," said Michele A. Martinelli of the AFRL Information Directorate's Contracting Division, the site's 2001 CFC chairman. "Contributions from the men and women at the laboratory will benefit charitable causes at both the local and national levels." @

Net Index

Due to the number of submissions we receive, some sections of *news@afrl* are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b

L@urels

Roundups

*Stay tuned for
February's edition
featuring...*

• PR's Dr. Roquemore leads team to award

• Rome awards \$22.9M contract for AMSTE Research

AFRL Fellows Banquet

• Researcher earns appointment for SPIE

• AFRL awards \$48.9M contract to Virginia firm

2002 Air Force Science Fair Program

*For more on these stories see news@afrl
<http://extra.afrl.af.mil/news/index.htm>*



REMEMBERING TERRORIST ATTACKS — Members of the color guard at the AFRL Rome Research Site prepare to raise the flag during ceremonies Dec. 11 marking the three-month anniversary of the Sept. 11 terrorist attacks on the U.S. In conjunction with observances around the world, the national anthem was played at 8:46 a.m. - coinciding with the time the first hijacked aircraft struck the World Trade Center in New York City. (Air Force photo by Albert P. Santacroce) @

To view the full text of these and other articles visit the *news@afrl* page on the Internet at <http://extra.afrl.af.mil/news/index.htm>.

To submit L@b L@urels or Roundups from your directorate, send a query to AFRL Public Affairs at:

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News Briefs and L@b Distinctions***